

# HVAC-R I

Course Duration: [Full Year](#)

Category: [Career & Technical Education](#), [Electives](#), [High School](#)

Assessment: [Pre-Test](#), [Lesson Practice](#), [Unit Exams](#), [Mid-Term Exam](#), [Final Exam](#)

Language: [English](#)

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## Course Overview

This Heating-Ventilation-Air Conditioning-and Refrigeration course, filmed in 3-D, provides students with a basic foundation of knowledge and skill required for a career in the HVAC-R field. It is the first in a two-part course of study preparing students for HVAC-R certification. Acellus HVAC-R I is A-G Approved through the University of California.

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## Scope and Sequence

### Unit 1 - Introduction to HVAC-R

In this unit students learn about the development and history of HVAC-R. They further discuss what heating, ventilation, air conditioning, and refrigeration are, and, in a general way, how they work. Students also discuss the role of the HVAC-R technician.

### Unit 2 - HVAC-R Career Opportunities

In this unit students learn about various career opportunities in the field of HVAC-R. They study the careers of industrial technicians, owner/operators, and sales in HVAC-R. They further discuss employee and employer responsibilities in this field.

### Unit 3 - Tools of the HVAC-R Trade

In this unit, students study the tools that are used in the HVAC-R trade. They begin with commonly-used HVAC-R hand tools, followed by electronic tools, specialty tools, and metal tools,

### Unit 4 - HVAC-R Safety

In this unit students learn safety precautions for working at heights, as well as how to safely handle refrigerants and oils, and how to safely work around gas furnaces. They also discuss safety precautions for the job site and electrical safety concerns.

### Unit 5 - Basic Electrical for HVAC-R

In this unit students come to understand the basics of electricity as it pertains to the field of HVAC-R. They learn about power generation and distribution, AC and DC power, and electrical theory. They study two basic laws of physics in electrical theory, and study Ohm's Law, and electric circuits, including series and parallel circuits, as well as voltage, current, and resistance. In addition, they learn about basic electrical components in an HVAC-R System, and about wiring schematics and symbols.

### Unit 6 - Thermodynamics

In this unit, students explore heat as energy. They learn about BTU's, heat transfer, latent heat, condensation, vaporization, and fusion. They investigate specific heat versus latent heat, as well as super heat, sub-cooling, state changes in a refrigeration cycle, and gauge pressure versus atmospheric pressure.

### Unit 7 - Major HVAC-R Components

In this unit students gain understanding of the major HVAC-R components. They study the compressor, metering devices, and evaporator and condenser coils.

### Unit 8 - Introduction to the Refrigeration Cycle

In this unit students begin to understand the refrigeration cycle. They have a quick review of the components, and then learn to identify various refrigerant lines. They learn about saturation soldering, brazing the condenser and evaporator, and about service valves. They learn to calculate super heat and sub-cooling, and learn about compressor types.

### **Unit 9 - Introduction to Heating**

In this unit students learn about heat transfer, conduction, convection, radiation, and combustion. They study incomplete combustion versus complete combustion, and learn what combustion efficiency is, as well as how to define AFUE. They learn the three fuels that are typically used for heating, as well as the components of a furnace. They also learn about the heat exchanger, the gas valve, induce draft motors, ignition systems, circulator blower motors, circuit boards, and safety switches.

### **Unit 10 - Copper and Plastic Pipe**

In this unit students learn the sequence of operation for an 80% furnace. They further learn about copper tubing, different copper tubing types, identifying copper labeling, copper tube sizes, and common copper tubing fittings. They learn to cut and measure copper tubing and how to properly hang and support copper tubing. Students also learn about different types of plastic pipe, different plastic pipe schedules, how to join plastic pipe, and about cementing solvent for connecting plastic pipe.

### **Unit 11 - Soldering and Brazing**

In this unit students learn to do soldering and brazing. They learn to prepare tubing and fittings for soldering and for soft solder, and learn the tools and equipment needed for brazing. They learn how to prepare the material and fittings for brazing, how to light and use an Oxyacetylene Torch, and how to braze dissimilar metals.

### **Unit 12 - Refrigeration**

In this unit, students gain understanding of refrigeration. They learn the difference between commercial and industrial refrigeration, and learn the main components in a refrigeration system. They study controls for refrigeration and the defrost cycle in refrigeration, and learn what to expect in a typical service call for refrigeration. In addition, they learn to do a hot gas defrost, a timed defrost, and a cycle defrost, and learn about refrigerants used in low temperature freezers.

### **Unit 13 - Scheduled Maintenance of A/C and Furnace (Residential)**

In this unit students learn to do a scheduled, residential air conditioner and furnace maintenance call. They learn to clean the blower assembly, the indoor coil, and the outdoor coil, and learn to check the air conditioning safety switches. They also learn to check and record the electrical readings and the pressure and temperature readings.